



Repairing Black and Decker - TS221 Ranger CD2000 Battery

Just like my other "high mileage" cordless screw driver, this Black & Decker model also stopped holding a charge. Here I will show how to build and replace the battery due to the unavailability of an original battery.

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INTRODUCTION

This was a great little product that has seen a lot of use around my shop. But like several other B/D products the rechargeable battery does not last and the replacement has been discontinued. I found a few through some online retailers, but the cost was on the average around \$36 plus shipping. Two ways to go with this, trying to either revive it by building a battery pack or to just dump it. Well, I am frugal, if I can fix it, I will.



TOOLS:

- [Phillips #2 Screwdriver](#) (1)
- [Soldering Workstation](#) (1)
- [Utility Scissors](#) (1)
- [Large Needle Nose Pliers](#) (1)



PARTS:

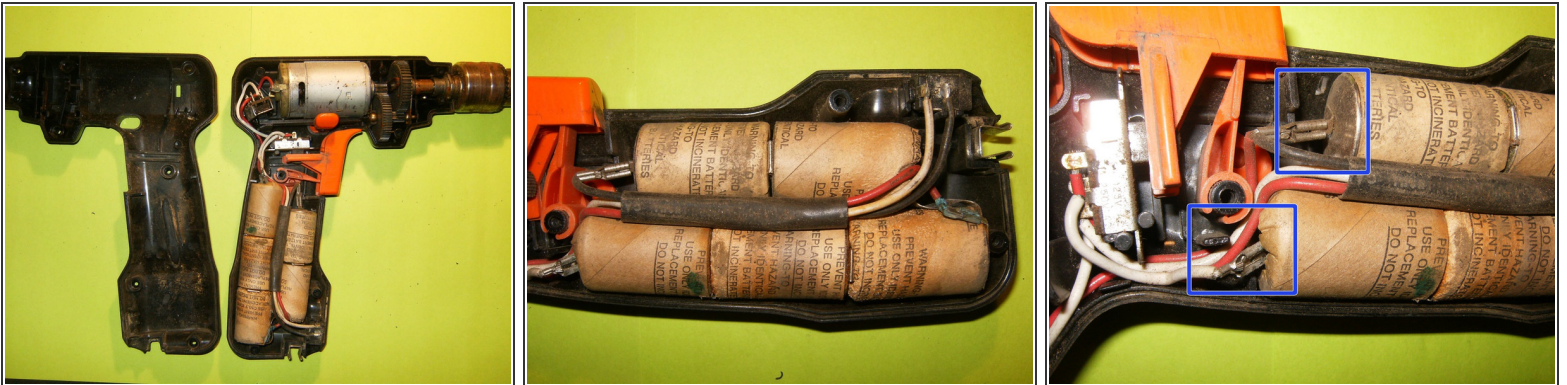
- [4/5 Sub C Battery cells 1.2V 2000maH](#) (5)

Step 1 — Repairing Black and Decker - TS221 Ranger CD2000 Battery



- Here is my 2 speed TS221 Ranger CD2000 that does no longer hold a charge.
- Removed the 8 Phillips screws from the case.
- All screws are 3/4inch long and therefore the location of the screws does not have to be marked.

Step 2



- Separate the case.
- Here is the old battery pack
- Disconnect the battery cables

Step 3



- Disconnect the battery cable on the bottom of the pack.
- It is easier to remove the top,
- and bottom cable with a pair of needle nose pliers.

Step 4



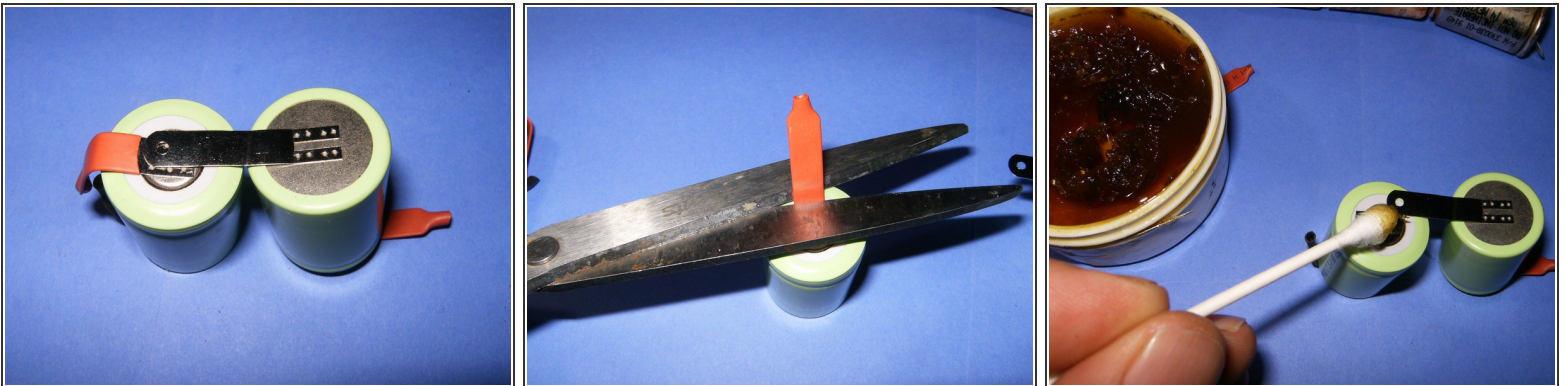
- Remove the battery pack
- Heavy corrosion can be found on all battery tabs,
- as well as some sort of liquid damage.

Step 5



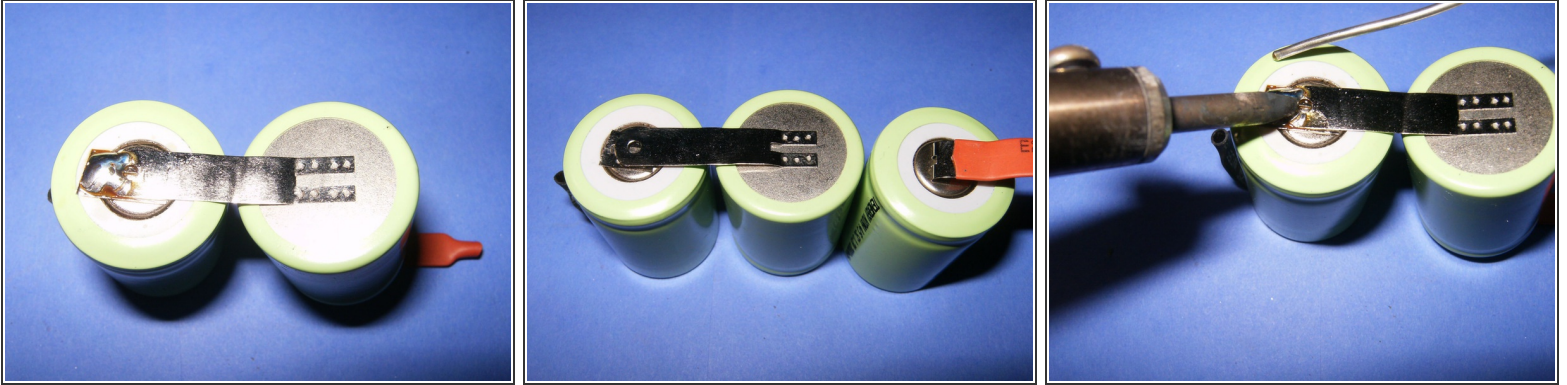
- The battery tabs or spot welded to the batteries.
- They are in series, meaning they connect from the positive post of one battery to the negative of the next.
- Here are the 5 replacement batteries. They are 4/5sub C batteries. This means the are 80% the size of a C battery. 1.3" (33.4mm) in length by 0.9" (23mm) in diameter. 5x1.2V in series gives 6V x 2000mah

Step 6



- Start off by laying the connections out. Again, negative connects to positive.
- The tabs are thin sheet metal and can be cut with a pair of scissors. cut the positive tab of the second battery. The left over spot welded tab will become the solder point for the first battery.
- Use flux between the connections.

Step 7



- Here is the first set soldered. Negative connects to positive.
- Continue with the next battery. Remember to now connect the negative from the second battery to the positive of the third.
- Again, use flux and solder the tab to the battery.

Step 8



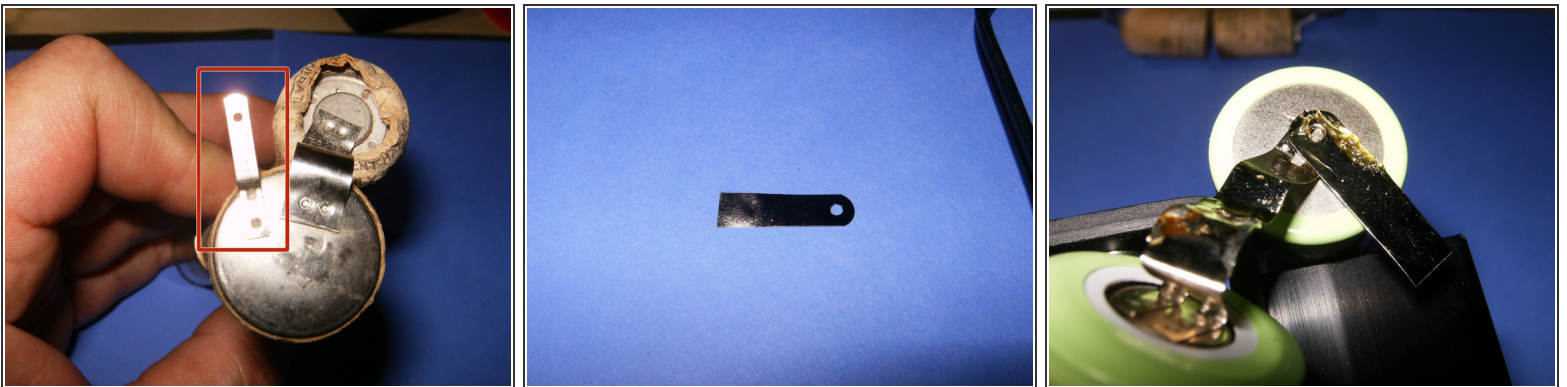
- Here is the completed first row of three batteries.
- To connect the next row, it is important to remember that the negative from the bottom row continues to connect to the positive of the top row
- Position the last two battery so that the polarity matches the way the connect to the back of three.

Step 9



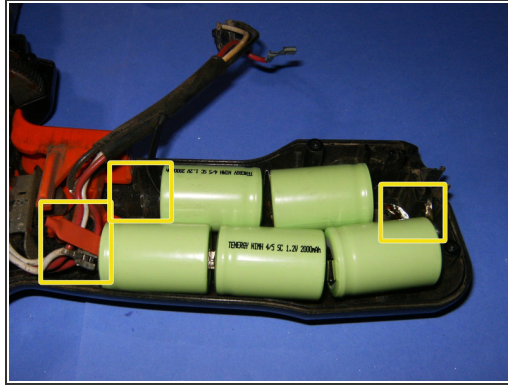
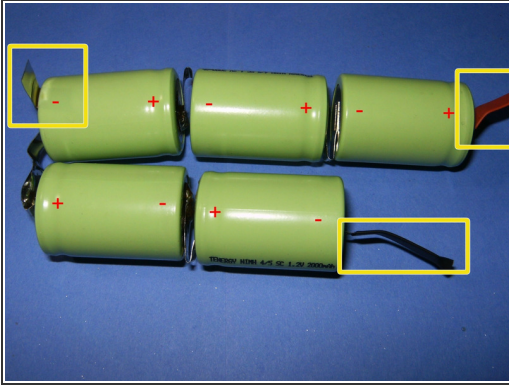
- Solder the top two batteries together.
- Position the batteries so they will match the proper polarity and do not cut the tabs.
- To connect the bank of three batteries with the last two, leave the tabs the original length and solder those tabs together. Use some hemostats or alligator clamps to hold the tab while soldering.

Step 10



- The bottom bank of three batteries has a cable connector on the negative post.
- Use one of the tabs previously cut off from one of the battery,
- and solder it to the negative post of the new battery pack

Step 11



- Here is the complete battery pack On this image the polarity is marked for clarification
 - Install the new battery pack and reconnect all the cables using the battery tabs as connector
 - Cover the new battery pack with some electric tape to minimize movement of the individual cells.
- total cost for the repair was \$13 and 2 hours of my time.

To reassemble your device, follow these instructions in reverse order.

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